OCCUPATIONAL ANALYSES SERIES

Ironworker (Reinforcing)

2006

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Occupational Analyses Series

Ironworker (Reinforcing)

2006

Trades and Apprenticeship Division

Workplace Partnerships Directorate

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Direction des partenariats en milieu de travail

Monteur/monteuse de charpentes en acier (barres d'armature)

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The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this occupational analysis as the national standard for the occupation of Ironworker (Reinforcing).

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This analysis was prepared by the Workplace Partnerships Directorate of HRSDC. The overall planning and coordination of the development of this National Occupational Analysis (NOA) were undertaken by staff members of HRSDC's Trades and Apprenticeship Division.

OTHER RELATED OCCUPATIONAL TITLES

This analysis covers tasks performed by Ironworkers (Reinforcing) whose occupational title has been identified by some provinces and territories of Canada under the following names:

- Ironworker (Reinforcing Rebar)
- Reinforcing Steel Erector

LIST OF RED SEAL NATIONAL OCCUPATIONAL ANALYSES

TITLE	NOC* Code
Appliance Service Technician (2005)	7332
Automotive Painter (2005)	7322
Automotive Service Technician (2005)	7321
Baker (2006)	6252
Boilermaker (2003)	7262
Bricklayer (2000)	7281
Cabinetmaker (2000)	7272
Carpenter (2005)	7271
Concrete Finisher (2006)	7282
Construction Electrician (2003)	7241
Cook (2003)	6242
Electrical Rewind Mechanic (1999)	7333
Electronics Technician – Consumer Products (1997)	2242
Farm Equipment Mechanic (2000)	7312
Floorcovering Installer (2005)	7295
Glazier (2004)	7292
Hairstylist (2005)	6271
Heavy Duty Equipment Technician (2004)	7312
Industrial Electrician (2003)	7242
Industrial Instrument Mechanic (2000)	2243
Industrial Mechanic (Millwright) (1999)	7311
Insulator (Heat and Frost) (2000)	7293
Ironworker (Generalist) (2006)	7264
Ironworker (Reinforcing) (2006)	7264
Ironworker (Structural/Ornamental) (2006)	7264
Lather (Interior Systems Mechanic) (2002)	7284
Machinist (2005)	7231

Metal Fabricator (Fitter) (2003)	7263
Mobile Crane Operator (2006)	7371
Motorcycle Mechanic (2006)	7334
Motor Vehicle Body Repairer (Metal and Paint) (2005)	7322
Oil Burner Mechanic (2006)	7331
Painter and Decorator (2000)	7294
Partsperson (2005)	1472
Plumber (2003)	7251
Powerline Technician (2004)	7244
Recreation Vehicle Mechanic (2006)	7383
Refrigeration and Air Conditioning Mechanic (2004)	7313
Roofer (2006)	7291
Sheet Metal Worker (2006)	7261
Sprinkler System Installer (2003)	7252
Steamfitter – Pipefitter (1996)	7252
Tilesetter (2004)	7283
Tool and Die Maker (2005)	7232
Transport Trailer Technician (2003)	7321
Truck and Transport Mechanic (2000)	7321
Welder (2004)	7265

* National Occupational Classification

Requests for these publications should be forwarded to:

Trades and Apprenticeship Division
Workplace Partnerships Directorate
Human Resources and Social Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
Gatineau, Quebec K1A 0J9

These publications are also available to order or download online at: **www.red-seal.ca**.

A comparative listing of apprenticeship training programs across Canada may be accessed at **www.ellischart.ca**. The Ellis Chart also lists the current provincial and territorial trade names.

FOREWORD

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to co-operate with provincial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Social Development Canada (HRSDC) sponsors a program, under the guidance of the Canadian Council of Directors of Apprenticeship (CCDA), to develop a series of occupational analyses.

The Occupational Analysis Program has the following objectives:

- to identify and group the tasks performed by skilled workers in particular occupations;
- to identify those tasks that are performed by skilled workers in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Standards "Red Seal" Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility, in Canada, of apprentices and skilled workers;
- to supply employers and employees, and their associations, industries, training institutions and governments with analyses of the tasks performed in particular occupations.

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GUIDE TO ANALYSIS

DEVELOPMENT OF ANALYSIS

A draft analysis is developed by a knowledgeable consultant who, with the assistance of a committee of industry experts in the field, identifies all the tasks performed in the occupation.

The draft is then assigned to occupational analysts at Human Resources and Social Development Canada (HRSDC) for translation and then returned to the consultant for review to ensure conformity with the nationally approved format.

The consultant then forwards a copy of this analysis to provincial/territorial authorities for validation by specialists in the field. Their recommendations are assessed and incorporated into the final draft which also includes the identification of the common core tasks performed in the occupation.

The occupational analysis is published in both official languages.

STRUCTURE OF ANALYSIS

To facilitate understanding of the nature of the occupation, the work performed is divided into the following divisions:

BLOCK – is the largest division within the analysis and reflects a distinct operation relevant to the occupation.

TASK – is the distinct activity that, combined with others, makes up the logical and necessary steps the worker is required to perform to complete a specific assignment within a "BLOCK".

SUB-TASK – is the smallest division into which it is practical to subdivide any work activity and, combined with others, fully describes all duties constituting a "TASK".

Supporting Knowledge & Abilities

The elements of skill and knowledge that an individual must acquire to adequately perform the sub-task.

Trends

Any shifts or changes in technology that affect the block.

Related Components

All components related to a specified task being undertaken by the Ironworker (Reinforcing).

Tools and Equipment

All tools and equipment necessary for the Ironworker (Reinforcing) to perform the work on all given tasks identified within the task.

VALIDATION METHOD

At the request of the Canadian Council of Directors of Apprenticeship (CCDA), the Standardization Sub-committee developed a method for validating the Red Seal National Occupational Analyses.

A draft of the analysis is sent to all provinces/territories for validation. Each jurisdiction rates the sub-tasks and applies percentage ratings to blocks and tasks. This method for the validation of the National Occupational Analysis identifies common core tasks across Canada for a specific occupation. This feature facilitates the weighting of the Interprovincial Standards "Red Seal" Examinations.

DEFINITIONS

YES: the sub-task is performed by workers in the occupation in a specific jurisdiction.

NO: the sub-task is not performed by workers in the occupation in a specific jurisdiction.

BLOCK %: the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, that will be placed on an interprovincial examination to assess each block of the analysis.

TASK %: the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, that will be placed on an interprovincial examination to assess each task of the analysis.

NV: Not Validated by a province/territory.

ND: Not Designated in a province/territory.

PROVINCIAL/TERRITORIAL ABBREVIATIONS

NL: Newfoundland and Labrador
NS: Nova Scotia
PE: Prince Edward Island
NB: New Brunswick
QC: Quebec
ON: Ontario
MB: Manitoba
SK: Saskatchewan
AB: Alberta
BC: British Columbia
NT: Northwest Territories
YT: Yukon
NU: Nunavut

COMMON CORE

The criteria for determining common core depend on the performance of sub-tasks. If at least 70% of the responding jurisdictions (excluding NVs and NDs) perform a sub-task, it shall be considered common core.

Interprovincial Standards "Red Seal" Examinations are based on the common core identified through this validation process. This process identifies what will be assessed through the interprovincial examination.

BLOCKS AND TASKS WEIGHTING (APPENDIX D)

This appendix represents the block and task percentages as submitted by each jurisdiction.

Each jurisdiction, with the use of a provincial/territorial occupational advisory committee, validates the content, places percentages on blocks and tasks, and indicates whether or not the sub-tasks are performed by the skilled workers within the occupation. The results of this exercise are submitted to the consultant who then analyzes the data and develops this appendix which provides the individual jurisdictional validation results as well as the national averages of all responses.

PIE CHART (APPENDIX E)

The graph depicts the national percentages assigned to blocks in the analysis.

SCOPE OF THE IRONWORKER (REINFORCING) OCCUPATION

Ironworkers (reinforcing) cut, bend, lay out, place and weld reinforcing steel rods, welded wire fabric and composite materials in a wide variety of poured concrete products and structures such as buildings, highways, bridges, stadiums and towers. They also place and stress various post-tensioning systems in structures such as parking garages, bridges and stadiums where longer unsupported spans are required.

Ironworkers (reinforcing) unload fabricated or straight reinforcing materials and place it for hoisting as needed. While the reinforcing material is usually pre-cut and fabricated off-site, ironworkers (reinforcing) may be called upon to cut and bend them according to design specifications and drawings. Ironworkers (reinforcing) may pre-assemble reinforcing material by laying it out and connecting sub-assemblies on the ground prior to final placement. They organize the hoisting of the components by connecting cables and slings to the components and directing crane operators. They position, align and secure components according to drawings, using a variety of methods. After placing post-tensioning systems, they stress the tendons to predetermined specifications using hydraulic jacks and pumps.

Ironworkers (reinforcing) work outside in all weather. They may also work in underground work sites. They work in a variety of locations ranging from remote areas where they could work on dams, bridges or mining projects, to urban environments where they could work on high-rise buildings, parking garages, transit systems, tunnels or stadiums. The work may require that they be away from home for extended periods of time. The work often requires considerable standing, bending, crawling, lifting, climbing, pulling and reaching and is often conducted in cramped, confined spaces or at heights. Hazards include injury from electrocution, falls or falling objects.

Ironworkers (reinforcing) are required to have good mechanical aptitude, the ability to visualize finished products in three dimensions, and the ability to work at heights in varying extreme climates. A thorough knowledge of the principles of lifting and hoisting is required as is a familiarity with a variety of metal fastening and joining methods. All ironworkers (reinforcing) are required to be competent in the use and care of a variety of hand and power tools and equipment such as tying tools, pry bars, jacks, torches, cut-off saws, hydraulic benders, shears, welding equipment, stressing equipment and cranes.

Because of the nature of the work, a primary concern of the ironworkers (reinforcing) is workplace safety; therefore ironworkers (reinforcing) must be thoroughly familiar with the applicable sections of local, provincial and federal building and safety codes.

Ironworkers (reinforcing) tend to work in teams, and team coordination is a large component of the occupation especially when hoisting and placing large, heavy components high above the ground.

Ironworkers (reinforcing) interact and work cooperatively with a wide variety of construction tradespeople such as ironworkers (structural/ornamental), crane operators, steel detailers, welders, carpenters, concrete finishers and metal fabricators.

OCCUPATIONAL OBSERVATIONS

Technology continues to contribute to many changes in equipment design and construction materials. These innovations require constantly changing methods and techniques governed by appropriate attitudes towards the current high standards for fabrication, erection and installation of components. Maintaining updated knowledge of these changes presents a daily challenge to the people of this trade.

The work of an ironworker (reinforcing), by its nature, possesses inherent hazards. Safe work procedures, best practices and job hazard analysis assist in controlling or eliminating hazards. However, errors in judgment or in practical application of trade knowledge can be costly, both in terms of injury to workers and damage to equipment or materials. Workers must maintain constant attention to the application of safety and accident prevention at all times.

Personal protective equipment such as fall arrest equipment, aerial lift platforms, breathing apparatus and fume extraction equipment have become an integral part of all worksites and places of employment.

Ironworkers (reinforcing) are increasingly being called on to document and maintain records due to more stringent laws and regulations. The end products in industrial and other applications must be appropriately installed, inspected and documented. This places more responsibility on supervisors, quality control personnel and the individuals who perform the installation and assembly of components. The tremendous variety in equipment and methods means that the ironworker (reinforcing) must be more knowledgeable and adaptable than ever before.

SAFETY

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties are aware of circumstances and conditions that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that a safety-conscious attitude and work practices contribute to a healthy, safe and accident-free working environment.

It is imperative to apply and be familiar with the Occupational Health and Safety Acts and Workplace Hazardous Material Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

As safety education is an integral part of training in all jurisdictions, personal safety practices are not recorded in this document. However, the technical safety aspect relating to each task and sub-task are included throughout this analysis.

ANALYSIS

BLOCK A

OCCUPATIONAL SKILLS

Trends: *There is greater emphasis on training and upgrading of ironworkers (reinforcing). There is also a greater awareness of safety and safer working conditions and an increased emphasis on job coordination and scheduling. Also, there have been significant changes in the engineering and technology of ironworker (reinforcing) tools and equipment such as laser levels and electronic measuring instruments.*

Task 1 Interprets occupational documentation.

Related Components: Drawings (structural, architectural, mechanical, engineering, detail and layout), codes [American National Standards Institute (ANSI), Canadian Standards Association (CSA), Concrete Reinforcing Steel Institute (CRSI), and Workplace Hazardous Materials Information System (WHMIS)], specifications, shipping documentation, manufacturers' manuals and occupational health and safety (OH&S) legislation.

Tools and Equipment: Architectural scales, calculator, measuring tape.

Sub-task

1.01 Interprets drawings and specifications.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

1.01.01	knowledge of types of drawings such as placement drawings, structural drawings, architectural drawings and bar list fabrication
1.01.02	knowledge of welding symbols
1.01.03	knowledge of abbreviations and technical vocabulary
1.01.04	knowledge of drafting techniques
1.01.05	ability to interpret drawing symbols

1.01.06	ability to correlate types of drawings such as structural drawings, architectural drawings, engineering drawings, detail drawings and erection drawings
1.01.07	ability to distinguish types of views
1.01.08	ability to relate drawings to worksite

Sub-task

1.02 Interprets standards, regulations and procedures.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

1.02.01	knowledge of standards such as CSA, ANSI and CRSI
1.02.02	knowledge of regulations such as OH&S Act, WHMIS and fall protection
1.02.03	knowledge of the location of standards, regulations and procedures
1.02.04	ability to apply procedures such as welding, assembly, placing, tensioning and grouting

Task 2 Communicates in the workplace.

Related Components: Manufacturers' documentation, manuals, record books.

Tools and Equipment: Communication devices (fax, cellular phone, telephone, photocopier, computer, radio, cameras, headsets, two-way radios, printers), flags.

Sub-task

2.01 Communicates with co-workers.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

2.01.01	knowledge of types of communication
2.01.02	knowledge of interpersonal communication techniques
2.01.03	knowledge of trade vocabulary
2.01.04	knowledge of barriers to communication
2.01.05	ability to write clearly and concisely
2.01.06	ability to actively listen
2.01.07	ability to check to confirm understanding

Sub-task

2.02 Communicates with other disciplines.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

2.02.01	knowledge of job-related terminology
2.02.02	knowledge of report formats
2.02.03	ability to actively listen
2.02.04	ability to translate technical terms into layperson language
2.02.05	ability to address others' concerns
2.02.06	ability to write reports in prescribed formats
2.02.07	ability to check to confirm understanding

Sub-task

2.03 Communicates with apprentices.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

2.03.01	knowledge of capability of apprentice
2.03.02	ability to listen, teach, coach and mentor
2.03.03	ability to supervise
2.03.04	ability to assess and record ongoing progress

Sub-task

2.04 Uses hand signals.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

2.04.01	knowledge of types of signals
2.04.02	knowledge of hand signals
2.04.03	knowledge of signal terminology
2.04.04	ability to select type of signals
2.04.05	ability to interpret signals
2.04.06	ability to select signals for type of equipment

Sub-task

2.05 Communicates electronically. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

2.05.01	knowledge of types of electronic communication devices such as cellular telephones, two-way radios and lap-top computers
2.05.02	knowledge of communication protocols and company reporting policies
2.05.03	ability to operate electronic communication devices
2.05.04	ability to send, receive and retrieve information from computers
2.05.05	ability to communicate through two-way radios and cellular phones

Task 3 Uses and maintains tools and equipment.

Related Components: Manufacturers' manuals, cleaning supplies, lubricating supplies.

Tools and Equipment: See Appendix A.

Sub-task

3.01 Uses hand tools. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

3.01.01	knowledge of types and uses of hand tools
3.01.02	knowledge of hand tool safety
3.01.03	knowledge of manufacturers' specifications on the use and care of hand tools

3.01.04	knowledge of types of measuring equipment
3.01.05	ability to select hand tools required for task
3.01.06	ability to identify damaged, worn or otherwise unsafe hand tools
3.01.07	ability to clean and store hand tools
3.01.08	ability to maintain hand tools

Sub-task

3.02 Uses power tools.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

3.02.01	knowledge of types and uses of power tools such as pneumatic, electric, gas powered and hydraulic
3.02.02	knowledge of power tool components
3.02.03	knowledge of operating procedures for power tools
3.02.04	knowledge of power tool safety
3.02.05	knowledge of manufacturers' recommended uses, limitations and maintenance of power tools
3.02.06	ability to select power tools required for task
3.02.07	ability to identify damaged, worn or otherwise unsafe power tools
3.02.08	ability to clean and store power tools
3.02.09	ability to maintain power tools

Sub-task

3.03 Uses bending tools and equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

3.03.01	knowledge of types and uses of bending equipment
3.03.02	knowledge of manufacturers' recommended uses and limitations
3.03.03	knowledge of potential hazards and safety issues
3.03.04	ability to select bending equipment
3.03.05	ability to set up and calibrate bending equipment
3.03.06	ability to identify damaged, worn or otherwise unsafe bending equipment

Sub-task

3.04 Uses aerial work platforms.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

3.04.01	knowledge of types and uses of aerial work platforms
3.04.02	knowledge of aerial work platform safety
3.04.03	knowledge of aerial work platform regulations and certification requirements
3.04.04	knowledge of aerial work platform components and accessories
3.04.05	knowledge of operating procedures of aerial work platforms

3.04.06	knowledge of manufacturers' specifications for use of aerial work platforms
3.04.07	ability to identify damaged, worn or otherwise unsafe aerial work platforms and equipment
3.04.08	ability to position aerial work platforms
3.04.09	ability to store aerial work platforms

Sub-task

3.05 Uses ladders. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

3.05.01	knowledge of types and uses of ladders
3.05.02	knowledge of safe operating procedures for ladders
3.05.03	knowledge of manufacturers' specifications for use and care of ladders
3.05.04	ability to position ladders
3.05.05	ability to secure ladders
3.05.06	ability to dismantle and store ladders
3.05.07	ability to identify damaged, worn or otherwise unsafe ladders

Sub-task

3.06 Uses scaffolding. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

3.06.01	knowledge of regulations pertaining to scaffolding

3.06.02	knowledge of types of scaffolding
3.06.03	knowledge of installation and dismantling procedures
3.06.04	knowledge of manufacturers' recommended uses and limitations of scaffolding
3.06.05	ability to position and erect scaffolding and install planking, guardrails and toe plates
3.06.06	ability to secure scaffolding, planking, guardrails, toe plates and related components
3.06.07	ability to dismantle and store scaffolding
3.06.08	ability to identify damaged, worn or otherwise unsafe scaffolding and planking

Sub-task

3.07 Uses personal protective equipment (PPE).

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

3.07.01	knowledge of types and uses of PPE such as hard hats, safety glasses, hearing protection, welding PPE, safety footwear and fall arrest equipment
3.07.02	knowledge of PPE safety
3.07.03	knowledge of manufacturers' recommended uses, limitations and maintenance of PPE
3.07.04	knowledge of workplace rules and regulations
3.07.05	ability to select PPE for conditions encountered
3.07.06	ability to use fall arrest equipment such as harnesses, safety belts and lines

	3.07.07	ability to identify damaged, worn or otherwise unsafe PPE
	3.07.08	ability to store PPE

Sub-task

3.08 Uses welding equipment. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	yes	NV	ND	yes	no	yes	yes	yes	yes	ND	ND	ND

	3.08.01	knowledge of provincial/territorial and applicable welding regulations
	3.08.02	knowledge of Canadian Welding Bureau (CWB) standards
	3.08.03	knowledge of welding processes and procedures
	3.08.04	knowledge of welding symbols
	3.08.05	knowledge of welding hazards
	3.08.06	knowledge of welding equipment
	3.08.07	knowledge of welding consumables
	3.08.08	knowledge of welding defects
	3.08.09	ability to set up welding equipment
	3.08.10	ability to perform welding processes
	3.08.11	ability to adjust welding parameters to suit site conditions
	3.08.12	ability to identify damaged, worn or otherwise unsafe welding equipment
	3.08.13	ability to store welding equipment

Sub-task

3.09 Uses oxy-fuel cutting equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

3.09.01	knowledge of cutting processes
3.09.02	knowledge of cutting equipment
3.09.03	knowledge of cutting consumables
3.09.04	ability to set up equipment
3.09.05	ability to inspect equipment
3.09.06	ability to adjust cutting parameters
3.09.07	ability to recognize cutting hazards
3.09.08	ability to identify damaged, worn or otherwise unsafe cutting equipment
3.09.09	ability to store cutting equipment and consumables

Task 4 Organizes work.

Related Components: Company standards, safety manuals, company policies, procedures and regulations, schedules/calendars, drawings, specifications.

Tools and Equipment: See Appendix A.

Sub-task

4.01 Organizes materials and supplies.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

4.01.01	knowledge of placing and assembly

4.01.02	knowledge of equipment capabilities and limitations
4.01.03	knowledge of site preparation
4.01.04	knowledge of shipping documentation
4.01.05	knowledge of storage principles
4.01.06	ability to schedule material and supplies required for job
4.01.07	ability to unload materials
4.01.08	ability to place and sort materials and supplies
4.01.09	ability to reconcile load with shipping documents
4.01.10	ability to secure equipment and materials

Sub-task

4.02 Marks layouts. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	no	yes	yes	yes	yes	yes	ND	ND	ND

4.02.01	knowledge of drawings
4.02.02	ability to interpret drawings
4.02.03	ability to use measuring devices and layout tools
4.02.04	ability to apply marking and layout techniques
4.02.05	ability to visualize finished product
4.02.06	ability to transfer drawing information to accommodate site conditions

Sub-task

4.03 Maintains safe work environment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

4.03.01	knowledge of safety regulations
4.03.02	knowledge of building codes
4.03.03	knowledge of applications of safety equipment such as fall arrest, fall restraint and work positioning
4.03.04	knowledge of safe work practices and limitations
4.03.05	ability to apply safety standards applicable to workplace
4.03.06	ability to install safety equipment such as guard rails, static lines, lifelines, screens, temporary flooring, warning signs and barriers
4.03.07	ability to maintain good housekeeping

Sub-task

4.04 Assesses site hazards.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

4.04.01	knowledge of policies and procedures
4.04.02	knowledge of codes and procedures
4.04.03	ability to recognize hazards such as floor openings, leading edges and obstructions
4.04.04	ability to control hazards

Sub-task

4.05 Plans work tasks.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

4.05.01	knowledge of specifications and drawings
4.05.02	ability to interpret specifications and drawings
4.05.03	ability to improvise to suit site conditions
4.05.04	ability to maintain schedule
4.05.05	ability to select materials and supplies required for task
4.05.06	ability to select equipment and tools required for task

BLOCK B

RIGGING AND HOISTING

Trends: *The occupation has seen an increase in the development and deployment of new technologies such as specialty rigging and the use of synthetic materials. The occupation has seen the increased presence of comprehensive regulations.*

Task 5 Selects rigging equipment.

Related Components: Chokers, slings, chains, hooks, shackles, thimbles, guys, clips, wire rope, spreader bar, balance beam, equalizer beam, blocks, fibre rope, cable puller, softener, charts.

Tools and Equipment: Hand tools, standard tools, PPE, rope and cable tugger, calculator, vernier calipers, marlinspike.

Sub-task

5.01 Matches load to lift capability.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

5.01.01	knowledge of types of lifting equipment such as hydraulic jacks, fork lifts, air pallets, pallet jacks and rollers
5.01.02	knowledge of the capacity of lifting equipment
5.01.03	knowledge of basic geometry
5.01.04	knowledge of weights and measures
5.01.05	ability to calculate weights of loads
5.01.06	ability to select rigging equipment
5.01.07	ability to calculate choker tension based on choker angle and load

Sub-task

5.02 Inspects rigging equipment. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

5.02.01	knowledge of types of rigging equipment
5.02.02	knowledge of manufacturers' specifications
5.02.03	knowledge of policies and procedures
5.02.04	knowledge of tools and materials
5.02.05	ability to identify defects
5.02.06	ability to report defects

Sub-task

5.03 Maintains rigging equipment. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

5.03.01	knowledge of types of rigging equipment
5.03.02	knowledge of manufacturers' specifications
5.03.03	knowledge of policies and procedures
5.03.04	knowledge of tools and materials
5.03.05	ability to perform maintenance procedures
5.03.06	ability to store rigging equipment

Task 6 Uses hoisting and lifting equipment.

Related Components: Structural members, pre-fabricated components.

Tools and Equipment: Hand tools, boom truck, zoom boom, come-alongs, hydraulic jacks, chain block hoist, tugger, bends, form boom, tag lines, strand jack system, carry deck.

Sub-task

6.01 Uses hoisting equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.01.01	knowledge of provincial/territorial and applicable specifications and certification regulations
6.01.02	knowledge of types of hoisting equipment such as come-alongs, chain block hoists and tuggers
6.01.03	knowledge of anchorage locations and capabilities
6.01.04	knowledge of policies and procedures
6.01.05	ability to select hoisting equipment
6.01.06	ability to select anchorage locations
6.01.07	ability to follow manufacturers' specifications

Sub-task

6.02 Uses lifting equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.02.01	knowledge of types of lifting equipment such as hydraulic jacks
6.02.02	knowledge of policies and procedures

6.02.03	ability to select lifting equipment
6.02.04	ability to follow manufacturers' specifications and recommendations

Sub-task

6.03 Attaches rigging to load.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

6.03.01	knowledge of hoisting procedures such as engineer's plan, multi-member and tandem lift
6.03.02	knowledge of placement and attachment location
6.03.03	knowledge of hoisting specifications
6.03.04	ability to select lifting procedures
6.03.05	ability to use and tie knots, bends and hitches
6.03.06	ability to follow rigging procedures
6.03.07	ability to use rigging equipment

BLOCK C

CRANES

Trends: *Modern cranes have greater lifting capacity and are more precise in the positioning of their loads, often within millimetres of specifications. The erection of cranes has also become more automatic, with modern cranes greatly assisting in their own erection.*

Task 7 Assembles cranes.

Related Components: Mats, pads, dunnage, boom sections and jib, counterweight, pins and cotter pins, bolts, blocks and sheaves, headache ball, hook, wedge socket bridle, mast, outriggers, gantry, cable components (pendant lines, jib lines, guide lines, load lines).

Tools and Equipment: Sledge hammer, back-out hammer (B & O hammer), wrenches, pry bars, rigging hardware, PPE, pliers, assist cranes, hand tools, types of cranes (rough terrain, all terrain, crawler, hydraulic, tower, boom, electric overhead travelling (EOT), gantries, knuckle boom).

Sub-task

7.01 Assesses site hazards.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	no	NV	ND	no	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

7.01.01	knowledge of types of hazards such as overhead power lines, underground services, other workers and obstructions to swing radius
7.01.02	knowledge of swing area (radius) of crane
7.01.03	ability to calculate crane radius
7.01.04	ability to identify potential hazards
7.01.05	ability to read load charts

Sub-task

7.02 Determines crane position. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	no	NV	ND	no	yes	yes	yes	yes	yes	ND	ND	ND

7.02.01	knowledge of crane types
7.02.02	knowledge of crane capacity
7.02.03	knowledge of crane radius
7.02.04	knowledge of maximum weight of lifts
7.02.05	knowledge of crane limitations due to inclement weather
7.02.06	ability to determine weights of components
7.02.07	ability to calculate the available headroom
7.02.08	ability to select crane for required task
7.02.09	ability to minimize overhead dangers

Sub-task

7.03 Prepares bases. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	no	NV	ND	no	yes	yes	yes	yes	yes	ND	ND	ND

7.03.01	knowledge of gross weight of crane
7.03.02	knowledge of composition of base such as soil, concrete and steel
7.03.03	knowledge of types of pads
7.03.04	ability to select pads such as mats, dunnage and cribbing
7.03.05	ability to visually assess ground conditions

7.03.06	ability to ensure ground is stable and level
7.03.07	ability to install falsework

Sub-task

7.04 Assembles cranes and components.

Supporting Knowledge & Abilities

(NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	no	NV	ND	no	no	yes	yes	yes	yes	ND	ND	ND

7.04.01	knowledge of sequence of assembly
7.04.02	knowledge of crane components such as boom sections, counterweights and jibs
7.04.03	knowledge of crane signals
7.04.04	knowledge of tools used in assembly of cranes
7.04.05	knowledge of safe rigging practices
7.04.06	ability to ensure adequate space for assembly
7.04.07	ability to install components
7.04.08	ability to reeve/lace blocks
7.04.09	ability to participate in engineered (critical) lifts
7.04.10	ability to finalize set-up

Task 8 Disassembles cranes.

Related Components: Falsework, mats, pads, dunnage, boom sections and jib, counterweight, pins and cotter pins, bolts, blocks and sheaves, drums and tracks, headache ball, hook, wedge socket bridle, mast, outriggers, gantries, rail tracks, cable components (pendant lines, jib lines, guide lines, load lines).

Tools and Equipment: Sledge hammer, B & O hammer, wrenches, pry bars, rigging hardware, jacks and rollers, pliers, PPE, assist cranes (rough terrain, all terrain, crawler, hydraulic, tower, boom, gantries, knuckle boom).

Sub-task

8.01 Disassembles crane components.

Supporting Knowledge & Abilities

(NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	no	NV	ND	no	no	yes	yes	yes	yes	ND	ND	ND

8.01.01	knowledge of method of disassembly
8.01.02	knowledge of sequence of disassembly
8.01.03	knowledge of equipment and tools required for task
8.01.04	knowledge of rigging
8.01.05	ability to recognize hazards of disassembly such as tensioned pins and overloads
8.01.06	ability to disconnect components
8.01.07	ability to direct crane operator
8.01.08	ability to rig crane components
8.01.09	ability to block boom sections

Sub-task

8.02 Prepares crane for transport.

Supporting Knowledge & Abilities

(NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	no	NV	ND	no	no	yes	yes	yes	yes	ND	ND	ND

8.02.01	knowledge of safe rigging practices
8.02.02	ability to select type of rigging
8.02.03	ability to place and secure components on transportation deck

BLOCK D

REINFORCING

Trends: *The occupation has seen the increased development and use of composite materials such as stainless steel tendons. New technologies are being developed and introduced to the occupation allowing for greater automation such as automated benders and tiers. More intricate and elaborate, non-linear building design has led to an increase in creative and innovative reinforcing techniques. The occupation has also seen an increase in the demand for compliance to new seismic codes.*

Task 9 Fabricates on-site.

Related Components: Rebar, welded wire mesh fabric, composite materials, tie wire, bar supports (bolsters, chairs and concrete blocks), dunnage, couplers, coupling devices.

Tools and Equipment: Sledge hammer, pliers, cutters, quick-cut saws, measuring tape, chalk, shears, bolt cutters, hickey, power wrench, pneumatic gun, portable grinder, rebar bender, power bender, hammer drill, rigging equipment, cutting torch, come-alongs, grip hoists, wire reel, work positioning hook.

Sub-task

9.01 Cuts material.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

9.01.01	knowledge of reinforcing material such as rebar, welded wire mesh fabric and composite material
9.01.02	knowledge of material specifications
9.01.03	knowledge of cutting techniques
9.01.04	ability to measure and mark material for cutting

Sub-task

9.02 Bends material. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

9.02.01	knowledge of reinforcing material such as rebar, welded wire mesh fabric and composite material
9.02.02	knowledge of material specifications
9.02.03	knowledge of bending techniques
9.02.04	ability to measure and mark material for bending

Task 10 Installs reinforcing material.

Related Components: Rebar, welded wire mesh fabric, composite materials, tie wire, bar supports (bolsters, chairs and concrete blocks), dunnage, couplers, coupling devices.

Tools and Equipment: Hand tools (sledge hammer, pliers, cutters, measuring tape, chalk, shears, bolt cutters, hickey), quick-cut saws, power wrench, pneumatic gun, portable grinder, rebar bender, power bender, hammer drill, rigging equipment, cutting torch, come-alongs, wire reel, work positioning hook, fall arrest equipment.

Sub-task

10.01 Places reinforcing material. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

10.01.01	knowledge of reinforcing material such as rebar, welded wire mesh fabric and composite material
10.01.02	knowledge of installation sequencing such as laying out and placing ties and supports

10.01.03	knowledge of pre-assembly and pre-fabrication procedures
10.01.04	ability to apply manual and mechanical lifting and carrying techniques

Sub-task

10.02 Ties material. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

10.02.01	knowledge of types of wire ties such as figure-8, snap tie and saddle tie
10.02.02	knowledge of tying specifications
10.02.03	knowledge of tying tools and equipment
10.02.04	knowledge of tying sequence
10.02.05	ability to select wire type and gauge depending on application
10.02.06	ability to tie variety of ties such as figure-8, snap tie and double wire tie

Sub-task

10.03 Joins material. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

10.03.01	knowledge of provincial/territorial and applicable welding regulations
10.03.02	knowledge of welding techniques
10.03.03	knowledge of splicing techniques
10.03.04	knowledge of mechanical splicing techniques

10.03.05	knowledge of specialty anchoring systems and installation
10.03.06	ability to select joining tools and equipment
10.03.07	ability to operate joining tools and equipment

BLOCK E

PRE-STRESSES/POST-TENSIONS

Trends: *The occupation has seen an increase in the use of composite materials resulting in changes to the pre-stressed and post-stressed tensioning systems. An increased awareness of environmental concerns has resulted in the development of new handling techniques and procedures. Due to the aging of major structures nationwide, the occupation continues to see an increase in repair and restoration. Advancements in technology have allowed for the construction of longer spans and larger open spaces.*

Task 11 Places pre-stressed/post-tensioning systems.

Related Components: Bulkheads, coils, anchors (barrel, cable), pocket former, cable tendons, bar tendons dead heads, trumpets, trumplates, wedges, wedge plates, blocks, duct, duct tape, bursting steel components, couplers, bearing plate, grout.

Tools and Equipment: Measuring tape, marking tools (crayons, soapstone, pencil), threaded rod, nuts, bolts, setting tools, grease, caulking, carousel, cable feeder, hammer, heat shrink, cutting tools, drill bits, pliers, wrenches, sockets, tie wire, knife, tiger torch, winches, air tugger.

Sub-task

11.01 Lays out profile.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

11.01.01	knowledge of types of pre-stressed/post-tensioning systems such as bonded, cable and un-bonded
11.01.02	knowledge of pre-stressed/post-tensioning materials such as strand, bar and anchors
11.01.03	knowledge of pre-stressed/post-tensioning installation practices
11.01.04	knowledge of placement tolerances of ductwork and supports
11.01.05	knowledge of benchmarks and elevations

11.01.06	knowledge of measuring systems such as metric and imperial
11.01.07	ability to lay out duct and tendon position

Sub-task

11.02 Places tendons and accessories.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

11.02.01	knowledge of types of pre-stressed/post-tensioning systems such as bonded, cable and un-bonded
11.02.02	knowledge of pre-stressed/post-tensioning materials such as strand, bar and anchors
11.02.03	knowledge of pre-stressed/post-tensioning installation practices
11.02.04	knowledge of pre-stressed/post-tensioning installation sequences
11.02.05	knowledge of tolerances
11.02.06	ability to position tendons and accessories
11.02.07	ability to secure tendons and accessories
11.02.08	ability to recognise and repair damage to ducts and tendons
11.02.09	ability to operate winching equipment

Sub-task

11.03 Installs bursting steel and anchorages.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

11.03.01	knowledge of types of bursting steel
11.03.02	knowledge of types of anchorages
11.03.03	knowledge of types of components such as blocks, wedges, anchors and coils
11.03.04	knowledge of bursting steel and anchorage installation procedures and placing tolerances
11.03.05	knowledge of rebar tying methods
11.03.06	ability to place, modify and tie bursting steel
11.03.07	ability to install anchorages

Sub-task

11.04 Connects tendons to anchors.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

11.04.01	knowledge of types of anchors such as barrel and cable
11.04.02	knowledge of types of tendons
11.04.03	knowledge of tendon and anchor connection procedures
11.04.04	knowledge of fastening techniques
11.04.05	ability to install anchors
11.04.06	ability to secure wedges

Sub-task

11.05 Protects exposed tendons. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

11.05.01	knowledge of tendon protection materials such as duct tape, heat shrink and grease/caulking
11.05.02	knowledge of protection techniques
11.05.03	knowledge of potential contaminants
11.05.04	ability to select tendon protection material
11.05.05	ability to identify and correct faults
11.05.06	ability to install tendon protection

Task 12 Stresses tendons.

Related Components: Stressing plates, caps, tendons, ducts, anchorage, blocks, wedges, heat shrink, duct tape, lock nuts, bars.

Tools and Equipment: Hydraulic jacks and pumps, hoses, power cords, hoisting equipment, rigging equipment, stressing equipment, marking equipment, de-coiler, carousel, measuring equipment, chucks, wrenches, sockets, setting tools, couplers, hammers, fork lifts, scaffolding, come-alongs, chain falls, grip hoists, dunnage, gauges, grinder, cut-off saw, safety barriers.

Sub-task

12.01 Sets up stressing equipment. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

12.01.01	knowledge of types of stressing equipment
12.01.02	knowledge of stressing sequence
12.01.03	knowledge of limitations of equipment

12.01.04	knowledge of power supplies
12.01.05	ability to position equipment
12.01.06	ability to connect components
12.01.07	ability to inspect equipment

Sub-task

12.02 Tensions tendons. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

12.02.01	knowledge of stressing sequence and procedures
12.02.02	knowledge of standards and specifications of stressing equipment
12.02.03	knowledge of potential deficiencies of tendons
12.02.04	knowledge of stressing tolerance
12.02.05	knowledge of tendon locking methods
12.02.06	ability to connect stressing equipment to tendons
12.02.07	ability to operate stressing equipment
12.02.08	ability to document elongation and gauge reading

Sub-task

12.03 Cuts and caps tendons. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

12.03.01	knowledge of standards and procedures

12.03.02	knowledge of cutting methods
12.03.03	knowledge of capping methods
12.03.04	ability to read, interpret and apply specifications
12.03.05	ability to operate cutting equipment
12.03.06	ability to secure caps to anchors

Sub-task

12.04 Removes stressing equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

12.04.01	knowledge of dismantling and disconnecting procedures
12.04.02	knowledge of storage procedures
12.04.03	knowledge of methods of disconnecting equipment from tendons
12.04.04	ability to disconnect equipment from tendons
12.04.05	ability to clean and maintain equipment
12.04.06	ability to store equipment

Sub-task

12.05 De-stresses tendons.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

12.05.01	knowledge of engineered procedures and specifications

12.05.02	knowledge of methods of restricting access to work zones
12.05.03	knowledge of possible structure failure during de-stressing procedure
12.05.04	ability to identify and rectify potential hazards such as equipment failure, material failure and danger zones

Task 13 Grouts tendons.

Related Components: Grout, water, admixtures, grout tubes and caps, tie wire, duct tape.

Tools and Equipment: Compressor, hand tools, cleaning equipment (scrapers, wire brushes, hammers), PPE (respirators, rubber gloves, goggles, protective clothing), grouting machine, hoisting and rigging equipment, buckets, safety barriers, screens, hoses (grout, air, water), generator, power cords, knife, grease gun, communication equipment, tarps.

Sub-task

13.01 Sets up grouting equipment. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

13.01.01	knowledge of types of grouting equipment
13.01.02	knowledge of grouting procedures
13.01.03	knowledge of equipment inspection procedures
13.01.04	knowledge of types of testing equipment
13.01.05	knowledge of material storage procedures
13.01.06	ability to organize material and equipment
13.01.07	ability to clean and maintain equipment
13.01.08	ability to troubleshoot grouting systems
13.01.09	ability to test systems and equipment

Sub-task

13.02 Installs grouts.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	ND	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

13.02.01	knowledge of grouting procedures
13.02.02	knowledge of measuring quantities and ratios
13.02.03	knowledge of types of grouting equipment
13.02.04	knowledge of environmental concerns of grouting
13.02.05	knowledge of sequence of mixing
13.02.06	knowledge of cleaning and maintaining procedures
13.02.07	ability to identify and rectify obstructions in ducts and hoses
13.02.08	ability to operate grouting equipment
13.02.09	ability to maintain grouting equipment
13.02.10	ability to use precision instruments to set machines

APPENDICES

TOOLS AND EQUIPMENT

Hand Tools

adjustable wrench
aligning bar (sleever bar)
bar clamps
bolt bag
button pump
combination square
cable cutters
chalk line
drill bits
flashlight
hammers
hickey bar
knocker wrench
needle nose pliers
pipe benders
pipe wrench
pliers
prybar
reel holder
rod bag
side/diagonal cutters
sledge hammer
tie wire reel
tool belt

Power Tools and Equipment

band saw
bender
chop saw
circular saw
compressor
disk
electric hacksaw
gas cut-off saw
gas deck saw
generator
grinder
hammer drill
hydraulic jacks (and accessories)
peening tool
porta band
power drill
tension control gun

Measuring and Layout Equipment

builders level
chalk line
laser level
measuring tape
optical levels
plumb line
rod level
scale
spirit levels
straight edges
string line
torpedo level
water level

Safety Equipment

air movers (fans)
anchor points
cables
eye wash facilities
fire blankets
fire extinguishers

Safety Equipment (continued)

first aid equipment
fume and toxic gas detector
guard rails
life lines
perimeter cables
portable lighting
ropes (fibre, wire)
signage
stanchion posts
warning tape
welding flash screens

Personal Protective Equipment (PPE)

breathable air pack
chin straps
coveralls (fire retardant)
ear plugs
face shields
fall arresters
full body harness
gloves
goggles
hard hat
insulated gloves
knee pads
lock-out kit
respirators
retractable lanyard
rope grabs
rubber gloves
safety belt
safety glasses
safety vest
steel toe boots
welding apron
welding gloves
welding helmet
welding jacket
welding shield

Scaffolding and Access Equipment

aerial work platforms
aluminium framed platform
aluminium planks
boom lifts
electrical articulated boom lift
electrical scissor lifts
electrical vertical lifts
end frames
extension ladder
floats (angel's wings)
gas powered articulated boom lift
gas powered scissor lifts
ladder jack scaffolds
ladders
mechanical scaffolds
ramps
rolling scaffolds
sawhorses
scissor-lift
stationary scaffolds
stepladders
swing stages
temporary access/freight elevator
tube and clamps

Speciality Tools and Equipment (Welding and Cutting Tools)

arc welding machine
bending table with pins
cutting tools (oxygen, acetylene, propane)
portable bender
radiograph
stud welding equipment
stud welding gun
submerged arc machine
thermal cutting machine

Rigging Equipment

beam clamps
binders
blocks
bridle hitch
cable clamps
chain
chain falls
come-alongs
dunnage
equalizer beam
fibre rope
hooks
mechanical/hydraulic jacks
multi-bearing rollers
multiple-leg bridle sling
ring and lines
shackles
sheaves
simple roller
softeners
spreaders
swivel
synthetic slings
tackle blocks
thimbles
turnbuckles
wedge sockets
winches
wire rope
wire rope slings

Handling Equipment

boom trucks
chain falls
cradle
forklifts (telescopic, electric, gas powered)
hand operated pallet truck
multi-bearing rollers
pallet jack
rollers
tugger

GLOSSARY

accessories	items used in conjunctions with reinforcing steel such as bar chairs, slab bolsters, etc.
girts	horizontal or vertical framing member to which sash, siding or other finished material is attached
grating	an arrangement of parallel or latticed bars which serve as the floor of a platform, walkway, etc.
miscellaneous iron products	any steel product or component that is not main structural supporting member
ornamental components	non-structural steel, precast or composite members

ACRONYMS

ANSI	American National Standards Institute
B & O hammer	back-out hammer
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CWB	Canadian Welding Bureau
EOT crane	electric overhead travelling crane
OH&S	Occupational Health and Safety
PPE	personal protective equipment
WHMIS	Workplace Hazardous Materials Information System

BLOCK AND TASK WEIGHTING

BLOCK A OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	10	15	NV	ND	25	6	10	5	20	15	ND	ND	ND	13%

Task 1 Interprets occupational documentation.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	25	40	NV	ND	30	20	10	10	30	30	ND	ND	ND	24%

Task 2 Communicates in the workplace.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	23	20	NV	ND	30	20	20	30	10	10	ND	ND	ND	20%

Task 3 Uses and maintains tools and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	28	10	NV	ND	10	20	35	20	50	30	ND	ND	ND	25%

Task 4 Organizes work.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	24	30	NV	ND	30	40	35	40	10	30	ND	ND	ND	31%

BLOCK B RIGGING AND HOISTING

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	10	25	NV	ND	15	35	25	20	20	20	ND	ND	ND	21%

Task 5 Selects rigging equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	54	50	NV	ND	50	30	50	60	50	50	ND	ND	ND	49%

Task 6 Uses hoisting and lifting equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	46	50	NV	ND	50	70	50	40	50	50	ND	ND	ND	51%

BLOCK C CRANES

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	5	0	NV	ND	0	10	25	5	10	5	ND	ND	ND	8%

Task 7 Assembles cranes.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	52	0	NV	ND	0	100	50	50	65	50	ND	ND	ND	100%

Task 8 Disassembles cranes. (NOT COMMON CORE)

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	48	0	NV	ND	0	0	50	50	35	50	ND	ND	ND	NCC*

BLOCK D REINFORCING

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	53	50	NV	ND	40	40	25	60	40	40	ND	ND	ND	44%

Task 9 Fabricates on-site.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	19	30	NV	ND	20	15	40	30	15	10	ND	ND	ND	22%

Task 10 Installs reinforcing material.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	81	70	NV	ND	80	85	60	70	85	90	ND	ND	ND	78%

BLOCK E PRE-STRESSES/POST-TENSIONS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	22	10	NV	ND	20	9	15	10	10	20	ND	ND	ND	14%

Task 11 Places pre-stressed/post-tensioning systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	34	50	NV	ND	60	60	40	40	45	60	ND	ND	ND	49%

Task 12 Stresses tendons.

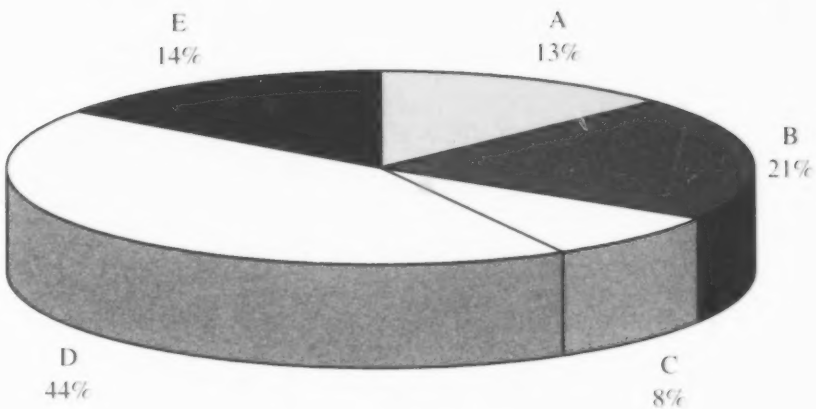
	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	45	40	NV	ND	30	20	40	30	35	30	ND	ND	ND	33%

Task 13 Grouts tendons.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	21	10	NV	ND	10	20	20	30	20	10	ND	ND	ND	18%

* NOT COMMON CORE

PIE CHART*



TITLES OF BLOCKS

Block A	Occupational Skills	Block D	Reinforcing
Block B	Rigging and Hoisting	Block E	Pre-stresses/Post-tensions
Block C	Cranes		

* Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

TASK PROFILE CHART – IRONWORKER (REINFORCING) (2006)

BLOCKS	TASKS	SUB-TASKS					
A OCCUPATIONAL SKILLS	**1. Interprets occupational documentation.**	1.01 Interprets drawings and specifications.	1.02 Interprets standards, regulations and procedures.				
	2. Communicates in the workplace.	2.01 Communicates with co-workers.	2.02 Communicates with other disciplines.	2.03 Communicates with apprentices.	2.04 Uses hand signals.	2.05 Communicates electronically.	
	3. Uses and maintains tools and equipment.	3.01 Uses hand tools.	3.02 Uses power tools.	3.03 Uses bending tools and equipment.	3.04 Uses aerial work platforms.	3.05 Uses ladders.	3.06 Uses scaffolding.
		3.07 Uses personal protective equipment (PPE).	3.08 Uses welding equipment.	3.09 Uses oxy-fuel cutting equipment.			
	4. Organizes work.	4.01 Organizes materials and supplies.	4.02 Marks layouts.	4.03 Maintains safe work environment.	4.04 Assesses site hazards.	4.05 Plans work tasks.	
B RIGGING AND HOISTING	**5. Selects rigging equipment.**	5.01 Matches load to lift capability.	5.02 Inspects rigging equipment.	5.03 Maintains rigging equipment.			
	6. Uses hoisting and lifting equipment.	6.01 Uses hoisting equipment.	6.02 Uses lifting equipment.	6.03 Attaches rigging to load.			
C CRANES	**7. Assembles cranes.**	7.01 Assesses site hazards.	7.02 Determines crane position.	7.03 Prepares bases.	7.04 Assembles cranes and components. **(NOT COMMON CORE)**		

IRONWORKER (REINFORCING) (2006)

BLOCKS	TASKS	SUB-TASKS				
	8. Disassembles cranes. (NOT COMMON CORE)	8.01 Disassembles crane components. (NOT COMMON CORE)	8.02 Prepares crane for transport. (NOT COMMON CORE)			
D **REINFORCING**	**9. Fabricates on-site.**	9.01 Cuts material.	9.02 Bends material.			
	10. Installs reinforcing material.	10.01 Places reinforcing material.	10.02 Ties material.	10.03 Joins material.		
D **PRE-STRESSES/POST-TENSIONS**	**11. Places pre-stressed/post-tensioning systems.**	11.01 Lays out profile.	11.02 Places tendons and accessories.	11.03 Installs bursting steel and anchorages.	11.04 Connects tendons to anchors.	11.05 Protects exposed tendons.
	12. Stresses tendons.	12.01 Sets up stressing equipment.	12.02 Tensions tendons.	12.03 Cuts and caps tendons.	12.04 Removes stressing equipment.	12.05 De-stresses tendons.
	13. Grouts tendons.	13.01 Sets up grouting equipment.	13.02 Installs grouts.			